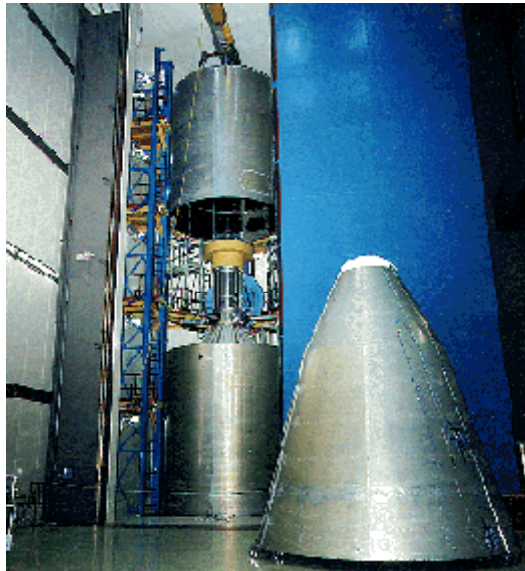


# Improved Acoustic Blanket Developed and Tested

Acoustic blankets are used in the payload fairing of expendable launch vehicles to reduce the fairing's interior acoustics and the subsequent vibration response of the spacecraft. The Cassini spacecraft, to be launched on a Titan IV in October 1997, requires acoustic levels lower than those provided by the standard Titan IV blankets. Therefore, new acoustic blankets were recently developed and tested to reach NASA's goal of reducing the Titan IV acoustic environment to the allowable levels for the Cassini spacecraft.

To accomplish this goal, the Cassini vibroacoustic team--consisting of members from the NASA Lewis Research Center, the Jet Propulsion Laboratory, Lockheed Martin Corporation, and McDonnell Douglas Corporation--developed and coordinated a two-phase test program. In Phase One, 19 different blanket designs were tested in a flat-panel configuration at the Riverbank Acoustical Laboratory in Geneva, Illinois. The parameters evaluated included blanket thickness, blanket batting density, and placement and density of an internal barrier. Each blanket's absorption and transmission loss characteristics were quantified and the two leading designs were selected for the Phase Two test series.

Phase Two consisted of acoustic testing of the two new blanket designs, along with the standard blanket design, in a flightlike, full-scale (60-ft tall) cylindrical payload fairing with a spacecraft simulator. This testing was performed at Lockheed Martin's acoustic chamber in Denver, Colorado. The acoustics and spacecraft vibration measured when the new blankets were used were compared with the acoustics and vibration obtained when the standard Titan IV blankets were used.



*Assembly of the payload fairing in the acoustic chamber, with spacecraft simulator and acoustic blankets for Phase Two testing.*

Both new blankets designs tested in Phase Two achieved the pretest goal of significantly

reducing the fairing's acoustic environment and spacecraft vibration response. The acoustic reduction achieved was 3 to 4 dB (decibels) at the important frequencies. One of the new blanket designs was selected for the Cassini mission. Because of this successful blanket development test program, key and expensive spacecraft components did not have to be redesigned and requalified, and an estimated \$30 million in cost savings was achieved for the Cassini program.

These blankets can also be used for other Titan IV missions or other launch vehicles. In addition, a wealth of information was obtained about how acoustic blankets work and how these blankets affect the acoustics within a payload fairing.

## **Bibliography**

Hughes, W.O.; and McNelis, A.M.: Cassini/Titan IV Acoustic Blanket Development and Testing. 1996 Proceedings--Institute of Environmental Sciences, 1996.